

Public Works Program Analyzed

Eligible Projects Fall into Four Classes—Specific Nature of Projects and Information Needed to Win Approval—Local Organizations Can Help by Sifting Out Worthy Improvements

THE \$3,300,000,000 public works bill was passed by Congress on June 13. A main objective of the public works administration will be to encourage a large number of small or medium-sized local projects which will put people to work at once near their homes, and which can be completed within a reasonable time. The program is put forward with a view to the need and utility of the projects and to the ability of the local communities, with the specified aid from the federal government, to finance them.

Help from Organizations

This presents an important opportunity to chambers of commerce and other civic organizations for constructive service to their communities. While the other major parts of the public works program will be carried out in large measure in accordance with existing schedules, the rapid sifting out of worthy local projects on which work should be started at this time will depend very largely upon the initiative and impartial action of chambers of commerce and other community organizations. Much assistance may also be obtained from local engineering societies, and from the National Committee for Trade Recovery, 330 West 42nd Street, New York.

The time element is important. The various parts of the proposed program must move forward together if the maximum volume of employment is to be provided. It is desirable, therefore, that properly qualified civic committees, in co-operation with the municipal government and other interested groups, should begin examination at once of the practical possibilities of the community's participation in this great national effort.

The Test of Qualification

Since determination of the suitability of proposed undertakings is one of the major problems of administering the law, it should be stated at the outset that certain general tests will be applied to all projects, regardless of the class to which they belong. These tests are:

1. Is the project needed?
2. How many men will it put to work?
3. How soon will the work start?
4. What will it cost?

Projects will be selected from three major classes of public works and from certain specified semi-public works. These fall under four separate headings. In each case

chambers of commerce may want to take action that will aid in speeding approval of the projects.

1. Federal Government Public Works

Projects Included: Public buildings, river and harbor improvements,

and practically all other public construction by the federal government.

Amount Allocated: Approximately \$900,000,000 of the total appropriated will be allocated to projects in this class.

Financed: Entire cost will be borne by the federal government.

Clearance of Proposed Projects: Through departments of the federal government.

Projects in this class will be selected from those already scheduled. The objective is to speed up construction which would eventually be undertaken in any case, utilizing to that end all existing agencies of the federal government which have responsibility for construction work.

Most of these projects will be presented for the consideration of the public works administration on the initiative of the departments of the federal government. With respect to a federal project of interest to a community—for example, flood control—local groups should communicate at once with the federal agency having jurisdiction over the project.

2. Federal Aid Grants to States for Highway Improvement

Projects Included: Elimination of traffic hazards, such as grade crossings, through highways within municipalities, by-passes, and feeder roads off the federal-aid highway system.

Amount Allocated: The sum of \$400,000,000 is authorized for distribution among the states on the basis of population, area, and post road mileage.

Financed: Entire cost to be borne by federal government; states not required to match the funds. Railway grade crossing elimination may be paid for by federal government even up to total cost, with state acting as agency for federal government in handling these grade eliminations.

Clearance of Proposed Projects: Through state highway departments and United States Bureau of Public Roads.

Projects will be selected in accordance with plans for state highway improvements. Wide latitude is given to elimination of traffic hazards on improved roads. States also in their discretion may allocate funds for local roads in counties and townships.

Projects in this class will be presented on the initiative of state highway departments. Local support of state agencies in getting the program under way by making known the benefits which will accrue, will greatly facilitate its successful execution.

3. Federal Grants and Loans to States, Cities, Counties and Other Political Subdivisions for Needed Public Works

Projects Included: Water supply and filtration plants, sewage disposal projects, street improvements, public buildings, and practically all other varieties of public construction by states, municipalities and other public bodies.

Amount Allocated: Approximately \$2,000,000,000 of the total appropriated, of which some \$500,000,000 will be used for grants and the remainder for loans.

Financed: Cost of a project up to 30 per cent of the cost of materials and labor entering into it may be borne by the federal government, the remainder of the cost to be financed by a reasonably secured loan from the federal government.

Clearance of Proposed Projects: Through governors of the states, who will be assisted by district representatives of the public works administration.

What form federal 30 per cent grants to local public works will take has not yet been determined. They may take the form of remission of interest and amortization charges on the loan during the period of construction, and thereafter until the amount of the grant is exhausted. Effort will be made to keep the interest rate and the rate of amortization on loans sufficiently moderate to make the financing attractive to municipalities. Loans will not be granted to cover expenditures already made on partially completed public works, but they may be made for the completion of such work.

Priority will be given to those projects, otherwise acceptable, which can be started with a minimum delay and which will afford maximum employment for the expenditure. It is important to note, however, that while the purpose is to provide employment, the public works law does not contemplate the financing of relief work in the form of so-called work relief projects. Federal aid for relief to those in distress is provided in another way which is being administered through a separate agency. The public works administration will be concerned with advancing sound public works which will be economically executed on the customary commercial basis. While preference will be given to local labor, it is expected that these regular public works projects will provide direct employment on the usual commercial basis, except as the law fixes maximum hours and requires payment of reasonable wages for the work on the project. In a word, these projects will be carried out as nearly as possible in accordance with normal accepted procedure. This means that the providing of secondary employment and the stimulation of business through the manufacture and transportation of materials are very definitely a part of the objective of the public works program.

Action by Civic Organizations

It is in this type of project that the greatest opportunity is presented to civic organizations to contribute to the success of the public works program. Impartial local judgment is indispensable to the sifting out of useful projects which should be recommended for construction.

Communities will serve their own best interests as well as the purpose of the law if they will confine their requests to those projects for which there is a clearly demonstrated need, and which the community, in view of the financing assistance made available by the federal government, can afford to undertake. This calls for a balanced judgment, based upon a careful analysis of all the pertinent facts, including the very important consideration of providing employment and relieving the city's budget of the costs of relief for which no tangible return is being obtained.

In recommending a project two sets of facts must be considered:

- (1) Facts regarding the project showing—
 - A. That it is needed and can be afforded.
 - B. What it will cost.
 - C. Percentage of cost that will go to salaries and wages and to materials.
 - D. Time it will take to get the work started after approval of project.
 - E. Time it will take to complete it.
 - F. Whether engineering and other planning work for the project has already been completed.
- (2) Facts regarding the municipality as a borrower, showing —
 - A. Whether its budget is balanced or steps have been taken to insure such balance.
 - B. Amount of bonds outstanding.
 - C. Legal limit of bonded indebtedness.
 - D. Whether bonds have been authorized for the project and have been approved by a reputable bonding house.

4. Federal Loans for Certain Semi-Public Works

Projects Included: Low-cost housing and slum clearance projects constructed under public regulation and control; bridges and other self-liquidating projects constructed by private corporations; railroad maintenance and equipment.

Amount Allocated: No definite amount as yet, but part of the funds will be eligible for this purpose.

Financed: Federal government loans, reasonably secured for 60 to 90 per cent of the cost, depending on the character of the project, the balance to be provided by private capital.

Clearance of Proposed Projects: Low-cost housing and slum clearance projects, through state and municipal housing commissions or boards where they exist, otherwise through the public works administrator; self-liquidating projects, through the Public Works Administration; railroad maintenance and equipment, through the Interstate Commerce Commission.

The authority given to the Reconstruction Finance Corporation to make loans to private corporations to aid in carrying out self-liquidating bridges, tunnels, docks, viaducts, water works, canals and markets projects is transferred to the public works administration. Financial assistance to the construction under public regulation and control of low-cost housing and slum clearance is specifically authorized by the new law.

The analysis and judgment of chambers of commerce and other local civic groups may profitably be brought to bear on projects in this class. It is desirable that there should be no delay in bringing forth and coming to conclusions with respect to sound projects which are eligible. Valuable assistance can be given in the acquisition of land and rights of way, which frequently are a major cause of delay.

Second Housing Conference to Be Held in September

As an outgrowth of the wide interest in home building, disclosed by the attendance of nearly 600 at the May conference in Chicago (see June issue of CONCRETE, page 13), the continuation committee has decided to call a second 2-day conference in September, the exact date to be announced later.

The committee has selected "National Association for Better Housing" as the name for the permanent association which the May conference decided to organize.

It is expected that the September conference will complete the details of the permanent association.

Engineers Week in Chicago Draws Many Convention Delegates

A. S. T. M. and A. S. C. E. Among Participating Technical Societies—Large Attendance at Gatherings—Terrazzo and Concrete Pipe Associations Meet

THE week beginning June 26, designated as Engineers' Week at Chicago's Century of Progress Exposition, found fifteen or more national engineering societies holding their annual conventions in the world's fair city as this issue of CONCRETE went to press.

Wednesday, June 28, was designated as Engineers' Day at the exposition, when all the societies assembled in Soldiers' Field Stadium at 10:00 a. m. to start the day's program of ceremonies, luncheons and sight-seeing trips and aerial demonstrations. The opening ceremony consisted of the presentation of the Guggenheim medal to Juan de la Cierva, inventor of the autogiro, who flew to the field in an autogiro to receive the award.

Luncheons in the fair grounds and tours of sight-seeing followed, each participating society conducting its own particular group.

A. S. T. M. in Annual Meeting

Notable among the technical societies participating in Engineers' Week is the American Society for Testing Materials, which held its thirty-sixth annual meeting at the Stevens Hotel from June 27 to 30, inclusive. A synopsis of the program, in so far as it deals with cement, concrete and concrete products, and materials for concrete, appears on page 9 of the June issue of CONCRETE. These parts of the program were scheduled for June 27 and 30. Abstracts of a number of the papers presented will be printed in later issues.

A. S. C. E. in 63rd Annual Meeting

The American Society of Civil Engineers, the oldest of the participating organizations, held its 63rd annual meeting at the Palmer House. Sessions were scheduled from Tuesday, June 27, to Friday, June 30, both inclusive. The first day's sessions were devoted to general engineering subjects, the second day to the Engineers' Day program mentioned above, while the third and fourth days were consumed largely by the sessions of the various technical divisions. These included divisions dealing with structural engineering, power, construction, waterways, highways, surveying and mapping, sanitation, and city planning.

A. C. P. A. in Session

The American Concrete Pipe Association held its twenty-sixth annual meeting at the Edgewater Beach Hotel, Chicago, on June 26 and 27. The program of that organization included several sessions in which the sales and marketing problems of the industry were discussed, and several devoted to papers and reports on manufacturing and technical problems.

Building Officials Meet

The Building Officials Conference of America held its annual meeting at the LaSalle Hotel on June 26, 27 and 28. This organization, with a membership drawn mainly from city building inspection officials, heard a number of papers on problems dealing with various phases of inspection, and the modernization of city building regulations.

Many Other Societies Meet

Engineers' Week in Chicago was utilized as the occasion for several annual meetings in nearby cities. Among these was the twenty-seventh annual meeting of the American Society of Agricultural Engineers, held at Purdue University, Lafayette, Indiana, from June 21 to 24.

Earlier in the month (June 12-16) the American Waterworks Association held its annual meeting in Chicago, and the National Terrazzo and Mosaic Association met at the Palmer House, Chicago, from June 19 to 22.

A happy event in the program of the terrazzo group was the dedication, on June 20, of the terrazzo mosaic esplanade approaching the Adler Planetarium, in the northern part of the exposition grounds. This esplanade, executed in twelve panels of rich design symbolizing the months of the year, was built by the National Terrazzo and Mosaic Association as its principal Century of Progress exhibit, to be left permanently in place.

Century of Progress a Powerful Magnet

Unquestionably the Century of Progress Exposition was the magnet that drew the large attendance at the annual conventions of the various technical societies. The plan of holding many of these meetings during the same week proved a success, for nearly all the delegates in attendance were interested in the convention programs of more than one organization.

Most of the convention programs, though well loaded with papers dealing with technical problems, allowed some leeway for the cultivation of the holiday spirit, and for the enjoyment of the displays at the exposition.

Contractors Drafting Control Code

A special meeting of the governing board of the Associated General Contractors of America was held at the Palmer House on June 26, for the purpose of promulgating a code of fair competition to be submitted for approval of the administrator of the National Industrial Recovery Act. It is expected that this code will become the governing charter of the contracting business throughout the United States.

Plan Low-Cost Fireproof Apartments for Slum Clearance Project

Reaching Lowest Rental Group with Modern Living Facilities
—47 Per Cent of Entire City Block Occupied—Rentals at
\$6.00 Per Room

A SLUM-CLEARANCE housing plan designed to bring modern fireproof apartments within reach of families having incomes below \$1,200 a year was developed by the Portland Cement Association more than a year ago.

New interest is now aroused in this plan, because of the expectation that housing construction of this type will occupy a prominent place during the period immediately ahead of us, and the further fact that housing projects of this character are specifically named as eligible for government loans under the provisions of Title II of the National Industrial Recovery Act.¹

To Occupy Entire Block

As in similar plans developed by others, the plan here illustrated involves the use of an entire block in the slum section of a large city. This means that all existing tenements and other buildings occupying the block will be demolished, though it is not to be supposed that the tenants occupying the new building will be the same class of people as those moving out of the old quarters. The tenants of the new building, if drawn from the class with family

incomes below \$1,200 a year, will be the "upper crust" of that class. Even though the apartments in the new building can be rented for \$6.00 a room, the type of tenement dweller who uses the bath tub as a place to grow radishes will find cheaper quarters in old buildings in the vicinity.

Minimum Needs of Families

The development of this housing plan was preceded by detailed studies of available literature and many consultations with social service workers and authorities on housing. From social service workers it was learned that families in the lowest rental group require 3 to 5 principal rooms, with a total floor area ranging from 425 to 625 sq. ft. From the same source, as well as from first-hand observation, it was learned that a dining room, as such, is not required. If both a dining room and a living room were provided, the family would convert one of them into a bed room. It was decided, therefore, to place the living room adjacent to the kitchen, so the former might be used also as a dining room.

Size and Number of Apartments

With these facts in mind, the plan evolved consists mainly of apartments of 3½ and 4½ rooms, having a net floor area of 470 to 565 sq. ft. The kitchen (or kitchenette) is counted as half a room because of its small floor area—about 60 sq. ft. The exigencies of the plan resulted in a small number of apartments of 2, 2½, 5½ and 6½ rooms. Specifically, the plan contains 32 apartments of 2 rooms each, 2 apartments of 2½ rooms, 319 of 3½ rooms, 87 of 4½ rooms, 2 of 5½ rooms, and 6 of 6½ rooms, bringing the total to 448 apartments with an aggregate of 1,627 rooms. The block occupied is 270 ft. wide and 600 ft. long, and 47 per cent of the land area is occupied.

Special Features of Plan

Examination of Figures 1 and 2 discloses a number of interesting features. To begin with, corridors are completely eliminated and hall space is kept at a minimum. The elimination of corridors is made possible by providing a principal entrance for every four families on a given floor. Since four floors are occupied—the building contains three full stories and an English basement—each entrance accommodates 16 families.

There is also a rear stairway of the fire-escape type, concealed in an inner court, serving the four kitchens on each floor and leading also to the laundry for each 16-family group, located in a penthouse on the roof. The floors in this inner court, or rear stairway shaft, are the open grille type employed in fire-escape construction, thereby permitting the free circulation of air.

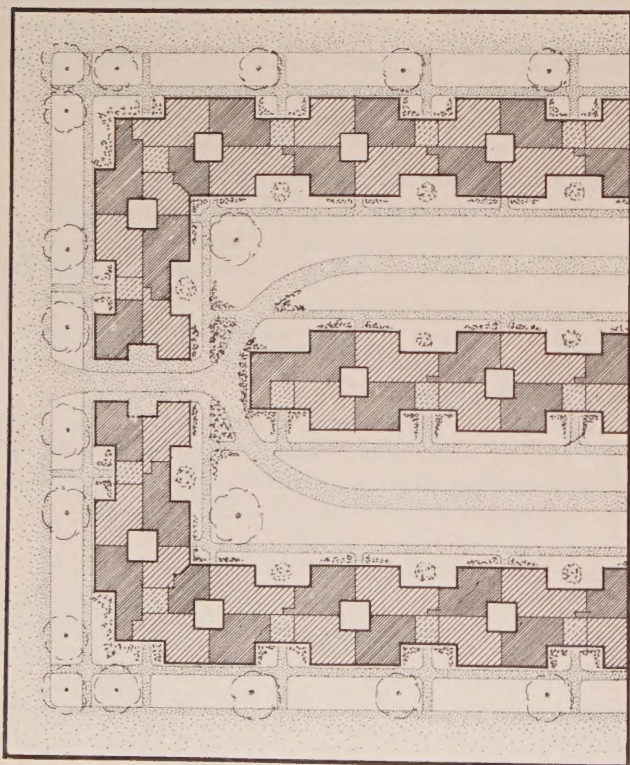


Figure 1. Left half of symmetrical block plan layout of slum-clearance housing project

¹ See June issue of CONCRETE, page 5.

Each apartment, except those having only 2 rooms, consists of a living room, kitchenette, bath room, and one or more bed rooms, the latter provided with metal wardrobes instead of closets. The kitchenette is equipped with a gas stove, sink, a refrigerator with cold air circulation from the inner court, a utility closet, a dish cupboard and a hot water heater. The gas for the stove and the hot water heater is paid for directly by the tenant, and this is true also of the gas consumed by the individual gas-fired steam radiators employed for heating the apartments.

The heating system just mentioned was selected because

kept in mind. Careful estimates, checked by competent estimators for companies experienced in the construction of large buildings, were made for eight types of combinations of wall construction. The final selection was an 8-in. wall of monolithic reinforced concrete, furred with a 3-in. light-weight concrete furring tile, and coated with cement paint on both sides.

For the 3-in. interior partitions, the selection consisted of the standard 3 by 8 by 16-in. light-weight concrete units, with one coat of cement paint applied to each side. In consequence, the partition units are identical with the

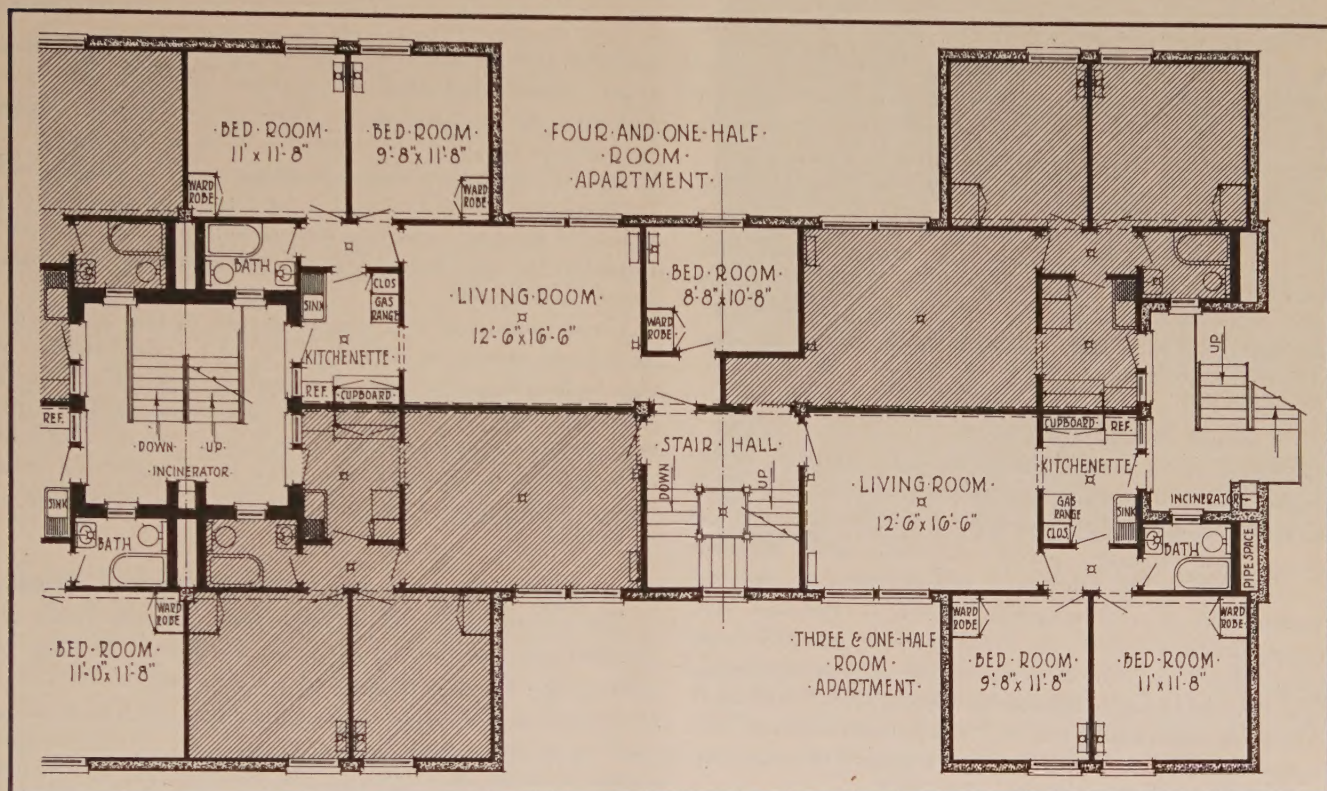


Figure 2. Plan of typical 3½-room and 4½-room apartments, adjoining driveway entrance from street

of the economy of installation, and the fact that it eliminates the need for a central heating plant, with its high cost of installation and operation, and the space that would be occupied. Under some conditions a central heating plant, with its greater efficiency, might be preferable.

Type of Construction

Detailed studies and estimates were made of various types of fireproof construction for the floors, walls and partitions. Several different types of reinforced concrete floor construction were considered, but in view of the short spans involved, and the simplicity of form work, the solid slab type was selected. Aside from cost, other advantages of the solid slab floor were seen in its shallow depth, and the fact that by painting directly on the flat concrete surface, ceiling plaster could be eliminated.

Nearly All Interior Plaster Eliminated

A detailed study of exterior wall construction was made with the view of determining the most economical type without sacrifice of quality of materials and workmanship. The desire to hold down the cost of construction by eliminating most of the interior plaster work was constantly

furring units, and all interior wall surfaces are finished in the same way, with all interior plaster work omitted, except on the walls of the kitchen and bath room.

Basis of Cost Estimate

In the preparation of the estimate of total cost, valuable assistance and co-operation were obtained from the estimating departments of building contractors and from real estate people. As a result of this co-operation, it is believed that the estimate of \$1.00 per sq. ft. for the land is ample for most cities, and that construction cost estimates are reasonably accurate. Both labor and material prices were those prevailing in Chicago in the late months of 1931 and early months of 1932. It is confidently believed that returns of 6 per cent can be made on the investment, above all charges, on a rental basis of \$6.00 per room.

Acknowledgment

The detailed investigation of the subject of low-cost housing of the type here described, and the development of the plans illustrated, were carried out by L. H. Corning, structural engineer, and Wal-Ward Harding, architect, at the general office of the Portland Cement Association.

Single-Track Concrete Roads

Economical Low Cost Type

Maintenance Costs Low—

**A. R. B. A. Committee Recommends
Use for Both Feeders and Primary Roads**

MORE than 3,100 miles of single-track concrete road has been built in the United States since the first mile was built in Wayne County, Michigan, in 1910. They are in use in 212 counties in 30 states.

Single-track concrete roads are built of standard concrete and are used successfully on main state roads as well as on local roads. In so far as slab construction is concerned there is very little difference between main state road standards and local road construction. There are differences in location and alignment needs as well as cross-section requirements.

State Route Requirements

On state routes it is desirable to place one edge of the single track on the center line of the roadway. The inside or center edge is raised one inch to provide drainage and crown. This procedure permits widening, when required, for the cost of the additional lane of paving. A 9-6-9 cross-section or a cross-section similar to two-lane state paving should be used. An 8-5-8 cross-section will prove advantageous on roads carrying only occasional trucks and buses. An edge bar is advisable. Widths of 8, 9 and 10 ft. have given satisfactory service. A minimum width of 9 ft. is generally preferred. One-half the standard two-lane paving width is used as a criterion for width.

Local Route Requirements

With local road construction it is found advantageous on light traffic routes to place the single-track road on the center line of the roadway. Minimum shoulder widths of 6 ft. for each side of the slab may be used safely. Center line location proves advantageous because both shoulders soon become sodded and require very little maintenance. Alignment policies should conform to grading requirements to reduce grading quantities to a minimum. The single track need not be on tangent for any great distances or exactly parallel to right-of-way lines.

Pavement Design

The cross-section may be 9-6-9 or 8-5-8 with edge bars. The width used may be 8, 9 or 10 ft. These widths will permit meeting vehicles to pass with one car entirely on the concrete and the other car with its two left-hand wheels on the concrete. The 8-ft. width requires 11 per cent less material than the 9-ft. width and gives a proportionately longer mileage at the same cost.

Specifications regarding the production and quality of

Condensed from Report of Committee on Use of Concrete for Low-Cost Road Construction, of the American Road Builders' Association. E. N. Gustafson, of Texas state highway department, chairman of committee.

concrete should conform in all respects to state specifications. Special investigations of local materials will permit their use in many cases. However, no leeway should be given to durability requirements of local aggregates.

One of the outstanding advantages of the single-track concrete road is the fact that it can carry full loads at any season of the year. For this reason, nothing should be permitted in the specifications which will jeopardize the quality of the concrete.

Local conditions will largely govern in the specific design requirements of each locality. An understanding of the underlying principles involved in using single-track concrete roads on both primary routes and feeder roads will dictate the best policies in each area. An 8-5-8 section will usually be advantageous, since it can carry the occasional truck or bus without endangering the investment in pavement.

Construction Costs of Single-Track Concrete Roads

The construction costs of single-track concrete roads are divided into two distinct elements, the cost of the slab or surface and the cost of grading and drainage structures.

Awards in 1932 show there is a definite relation between slab costs and cross-section, or cubic yards of concrete per mile, as might be expected. The average cost of 139,000 square yards of 9-ft. slab with 9-6-9 cross-section in Illinois was \$7,640 per mile. The minimum award was for \$6,748 per mile and the maximum, \$8,955. A total of 230,000 sq. yd. of 10-ft. slab with 9-6-9 cross-section averaged \$8,320 per mile, with a minimum of \$7,468 and a maximum of \$10,284. These roads were built to state specifications and represent the highest construction standards.

A 9-7-9 by 10-ft. section costs about \$9,750 per mile in Michigan. A 9-6½-9 by 10-ft. section costs about \$8,870 per mile in Washington, and between \$8,030 and \$8,715 for 9-ft. widths in Maryland.

Grading and drainage costs vary with the natural terrain and grading refinements. In average hilly country in Illinois, grading and drainage costs vary from \$1,000 to \$6,500, with an average cost of about \$4,000 per mile. The grading and drainage standards are the same as on state highways, which average \$6,630 for the past 10 years. It is therefore evident that grading and drainage costs for the highest standards will average about \$4,000 to \$6,500 per mile in the states of the Mississippi Valley.

Such grading and drainage costs as are available for strictly local road construction average about \$2,000 a mile. Costs reported from Washington average between \$1,500 to \$2,000 per mile.

Surface maintenance on single-track concrete roads can

be divided into two operations — slab maintenance and maintenance of the remainder of the traveled roadway. Maintenance on the slab consists of periodic filling of cracks and joints with bituminous material and constitutes practically the entire cost of keeping the slab in condition. Maintenance operations on the remainder of the traveled roadway consist of grading and dragging. This is not a continuous daily operation, since the unpaved portion of the roadway is generally used for less than two per cent of the distance traveled by the vehicle. As a result, it often stays in excellent condition for months with practically no attention.

The unpaved portion of the traveled roadway receives the most attention the first spring after the slab has been placed. At this time, drags or graders are used to bring up earth or metal flush with the edges of the slab. This is carefully watched during the spring months, and as it is worked away it is carefully bladed back into place. By summer it becomes thoroughly packed and consolidated along the pavement edge. Once the shoulder becomes thoroughly packed, for a width of eight or ten inches along the slab, it requires no more attention than the remainder of the unpaved roadway.

The light maintenance needed on single-track concrete roads is directly traceable to the fact that a very large portion of the travel is on the slab. Turn-outs, when necessary, are not concentrated at any particular point, and for this reason ruts do not form to hold water and soften the shoulder, or material is not worked from the roadway.

Maintenance Costs

Maintenance costs of single-track concrete roads are reported from many sections of the country. Samuel Knopf, assistant chief engineer of the Delaware Highway Department, reports state-maintained single-track roads in Delaware cost an average of \$95 per mile per year. About \$25 of this is spent for slab maintenance, the remainder being spent on the rest of the roadway between right-of-way lines and includes weed and grass cutting three times a year. Maintenance of the traveled roadway probably was equal to the slab maintenance, bringing the total annual maintenance to \$50 per mile for the traveled roadway.

L. O. Brayton, county engineer of Dyer County, Tennessee, reports the maintenance costs of single track concrete roads in Dyer County at \$50 per mile per year. These roads are in the gumbo of the Mississippi River bottoms, are ten years old and carry an average of more than 200 vehicles per 12-hour day.

Bay County, Michigan, has been building single track concrete roads for several years. Traffic on these roads consists of heavy beet trucking in the fall and trucking of heavy dairy products all year. Maintenance costs on these roads, as taken from detail records made available by the county engineer, show that their roads cost less than \$50 per mile per year. Before paving with single track concrete, the same roads, then gravel, cost from \$1,000 to \$1,500 per mile per year for maintenance.

P. C. A. Dallas Office to State Capital

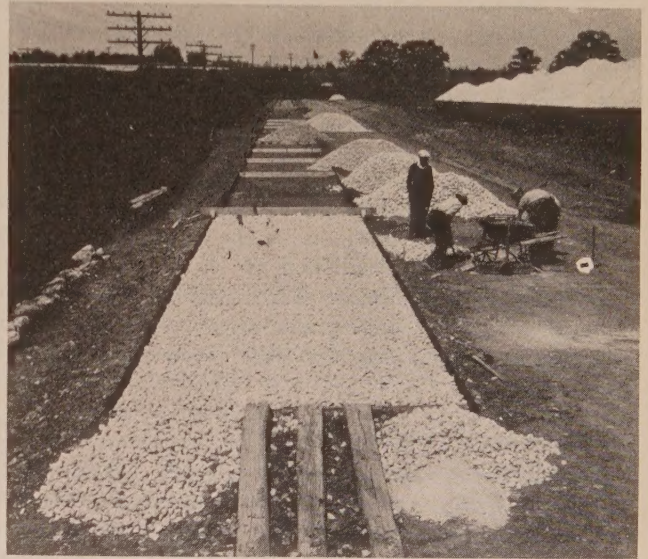
The Portland Cement Association announces the removal of the Dallas office to 1301 Norwood Building, Austin, Texas, the state capital.

T. B. Warden is the district engineer.

Building Cement-Bound Macadam Test Road Near Chicago

Engineers planning to attend The Century of Progress exposition in Chicago will have an opportunity to see one of the most interesting tests in road construction that is to be carried on anywhere in America this summer.

To assist engineers and contractors in securing efficiency and economy in the design and construction of cement-



Scene at construction of experimental cement-bound macadam road near Chicago

bound macadam, the Portland Cement Association is engaged in building an experimental road of this type, near Elmhurst, Illinois, just west of Chicago. Sixty test sections are to be built, making a road 1,200 ft. long.

The principal objective of this test is to develop and demonstrate design and construction practices that will permit cement-bound macadam to be used efficiently under practically all conditions. Field tests will be reinforced by investigations in the association's research laboratory. Crushed stone, slag and gravel will be used in the various test sections, with grout of varying consistencies. Included with many tests, will be the effect of vibration, as compared with rolling, in securing compaction and thorough penetration of the pavement.

Construction started during the week of June 12 and will continue approximately five weeks.

PERSONALS

James H. Cumiskey, for several years general manager of the Empire Steel Partition Co., Inc., New York City, and for more than twenty years associated with the hollow metal industry, has engaged in the business of general contracting under the name of Northern Contracting Co., with office at Elmhurst, Long Island, specializing in residence building construction and alterations. Manufacturers and dealers in all classes of building products are invited to forward samples and literature.

New Formulas Offered for Design of Reinforced Concrete Columns

Majority Report of Committee 105 of A. C. I. Evaluates Results of Full-Size Column Tests at University of Illinois and Lehigh University

IN a tentative final report printed in the February (1933) *Journal* of the American Concrete Institute, F. E. Richart, chairman of Committee 105 of the A. C. I., publishes the conclusions drawn from the series of tests of full size reinforced concrete columns conducted during the past two years under the sponsorship of the institute.

The report presented by Prof. Richart has the approval of five of the seven members of the committee, namely, F. E. Richart, F. R. McMillan, W. S. Thomson, W. F. Zabriskie, and P. H. Bates. The remaining two committee members—R. L. Bertin and Inge Lyse—approve the summary of the test data but disapprove the design formulas presented.

New Design Formulas Offered

After discussing the principal test results and the choice of type of design formulas, the committee report offers the necessary column formulas for the use of the designer. In each case certain limitations as to design and details of reinforcement, with which the formulas are intended to be used, are given.

1. *Spirally Reinforced Columns*—The maximum permissible axial load on columns reinforced with longitudinal bars and closely spaced spirals enclosing a circular core shall be that given by formula 7.

$$P = A_g (0.25 f_c' + 0.45 f_y p_g) \dots \dots \dots 7$$

The ratio, p_g , of the effective cross-sectional area of the vertical reinforcement to the gross area, A_g , of the column, shall not be less than 0.01 nor more than 0.08. The symbol f_c' represents the compressive strength of 6 by 12-in. concrete control cylinders, and f_y is the yield point stress of the vertical reinforcement. The minimum number of bars shall be four. The center to center spacing of bars within the periphery of the column core shall not be less than $2\frac{1}{2}$ times the diameter for round bars or 3 times the side dimension for square bars. The clear spacing between bars shall not be less than 1 in. or $1\frac{1}{3}$ times the maximum size of the coarse aggregate used. These spacing rules apply to the bars at a lapped splice.

The spiral reinforcement shall be of such amount and quality that the load-carrying capacity of the spiral shall be 15 per cent greater than that of the concrete shell outside the core. The spiral ratio, p' , to satisfy this requirement is given by the equation

$$p' = \frac{0.43 f_c' (R - 1)}{f_s'} \dots \dots \dots (8)$$

In applying Equation 8, the useful limit stress of the spiral steel, f_s' , shall be taken at 40,000 p. s. i. for hot rolled rod of intermediate grade (A. S. T. M. Designation A15-30) and 60,000 p. s. i. for cold drawn wire (A. S. T. M. Designation A82-27). The symbol R is the ratio

A_g/A_c , in which A_g , as stated above, is the gross area of the column, and A_c is the cross-sectional area of the core of a spirally reinforced column.

The spiral ratio, p' , shall not be less than the value given by Equation 8, nor shall it be less in any case than $1\frac{1}{8}$ per cent for hot rolled spirals of intermediate grade or $\frac{3}{4}$ per cent for cold drawn wire spirals.

The spiral reinforcement shall consist of evenly spaced continuous spirals held firmly in place and true to line by at least three vertical spacer bars. Where splices must be made in spiral rod or wire, butt-welds are recommended. The center to center spacing of the spirals shall not exceed 3 in. nor one-sixth of the core diameter. The clear spacing between spirals shall not be less than $1\frac{1}{2}$ in., nor $1\frac{1}{3}$ times the maximum size of coarse aggregate used.

2. *Tied columns*.—The permissible axial load on columns reinforced with longitudinal bars and separate lateral ties is given by formula 9—

$$P = A_g (0.2 f_c' + 0.36 f_y p_g) \dots \dots \dots (9)$$

The ratio, p_g , of the effective cross-sectional area of the vertical reinforcement to the gross area, A_g , of the column, shall not be less than 0.005 nor more than 0.03. The reinforcement shall consist of not less than four bars, placed with a clear distance from the face of the column of not less than 2 in.

3. *Splices in Vertical Bars*.—Where lapped splices in the column verticals are used, the minimum amount of lap shall be as follows: (a) *For deformed bars*—with concrete having a strength of 3,000 p. s. i. or above, 24 diameters of bar of intermediate grade steel and 30 diameters of bar of hard grade steel. For bars of higher yield point, the amount of lap shall be increased in proportion to the yield point stress. When the concrete strengths are less than 3,000 p. s. i., the amount of lap shall be one-third greater than the values just given. (b) *For plain bars*—the minimum amount of lap shall be 25 per cent greater than that specified for deformed bars.

For cases in which the requirements for bar spacing do not permit the use of lapped splices, welded splices or other positive connection shall be used.

Conference on Slum Clearance to Meet in Cleveland

National Conference on Slum Clearance is the official name of a conference to be held in Cleveland on July 6 and 7, called by Mayor Miller and the Cleveland City Council.

John H. Millar, publisher of Millar's Housing Letter, has been placed in charge of arrangements and has established headquarters in the Builders Exchange Building, in Cleveland.

EDITORIAL

Gasoline Tax Diversion Gets Another Blow

GASOLINE tax diversion has received another blow on the chin. In last month's issue the editorial headed "Why Not a Show-Down?" told of the ruling handed down by the attorney general of Minnesota to the effect that gasoline tax allotments to counties may be used only for construction, maintenance and improvement of county-aid roads.

On June 21 a victory of far greater importance was won in Illinois, where the diversion of highway construction funds has been running rampant, when Judge L. E. Stone, sitting in the Sangamon County (Springfield) circuit court held that diversion of the gasoline tax for use in unemployment relief was unconstitutional. Judge Stone upheld the plea of the Illinois Construction Council and granted it a permanent injunction restraining the state auditor from allocating gasoline tax funds for unemployment relief purposes.

While the Illinois decision does not finally dispose of the case, it does throw the whole matter into the courts. In the meantime the injunction prevents further diversion while the expected appeal from the decision is pending. As a direct result, the Illinois state highway department has resumed its road-building functions.

Judge Stone's decision should be given the widest possible publicity, for it may turn out to be the favorable turning point in the desperate fight against gasoline tax diversion.

Highway Transportation Can't Be Stopped

THIS gem from the National Highway Users' Conference places the white light of exposure on one of the loudest wails of the loud wails coming from the railroad publicity bureaus. Says the N. H. U. C.:

"The present 'plight of the railroads' is often laid to 'unregulated competing forms of transportation.'

"A comparison of railroad receiverships during the past five years with receiverships during the depression of the nineties is significant.

"During the period from 1928 to 1932, inclusive, 40 railroads, operating 22,417 miles of track, were placed in receivership. During the period from 1892 to 1896, inclusive, 213 railroads, operating 56,403 miles of track, were placed in receivership.

"There were no buses and no trucks in the nineties."

And, it might be added, there were no concrete roads in the nineties. Now we have buses and motor trucks and we have concrete roads upon which to

operate them. These motor vehicles will continue to use the roads, whether regulated or unregulated, in spite of the well organized and well financed opposition of Uncle Sam's most coddled industry.

The tide of highway transportation is rising. Railways can utilize it, or co-operate with it, but they cannot stop it. How much longer will it take railroad people to learn this simple fact?

Fast Work in Wisconsin

THE Wisconsin highway department has displayed most commendable energy in its preparations for bringing the state's allotment of federal highway funds to the contract stage.

Wisconsin expects an allocation of nearly 10 million dollars from the 400 millions provided in the public works title of the National Industrial Recovery Act passed on June 13. But the state highway department did not wait for the enactment of the bill before starting preparations to utilize its portion of the fund. On June 6 bids were taken for 1,200,000 barrels of cement, the awards to be made as soon as the allotment receives official approval from Washington. In the meantime a complete construction program has been mapped out for the utilization of the fund.

This is in refreshing contrast to the political dust storm raised over the price of cement by the state administration in the neighboring state of Illinois, where the highway construction program was held up for months for reasons best known to the politicians.

Keep General Construction Work Going

BECAUSE of the vast scope of activities involved in putting the new public works bill into effect, there is danger that we may lose sight of other movements that deserve our continued attention and support.

The numerous campaigns for modernizing old buildings, the notable success in some counties where relief funds are converted into useful construction work, and the growing revival in dwelling house construction, all are matters of major importance.

It will be a mistake to permit our interest in these movements to lag, because of our preoccupation with the greater and newer opportunities presented in the public works title of the Recovery Act.

The construction industry needs all the help it can get, regardless of the amount of help or the source from which it comes.

PROGRESS—In a Page

◀ Current activities in research, in matters pertaining to concrete and cement, as being carried on or completed by various organized groups. ▶

Precast Concrete Floor Units Patented by British

SEVERAL patents recently granted to British inventors cover specially designed precast concrete floor units, according to *Building Science Abstracts*.

One of the patents, No. 376,152, granted to R. Stransky, relates to a hollow block having longitudinal lips at its lower edges which abut with those of adjacent blocks to form molds for monolithic concrete joists. The ends of the blocks are chamfered to the full depth of the block to form a transverse V-shaped space into which monolithic concrete is placed, thus keying them together.

A second patent, No. 376,228, granted to L. Navratil, concerns a hollow block, which is interlocking with adjacent blocks. The blocks are provided with tongues and grooves, so spaced as to form recesses for steel reinforcement. After the steel is placed the recesses are filled with concrete.

Copies of British patents may be obtained by addressing Patent Office, Industrial Property Department, Board of Trade, 25 Southampton St., London, England.

Surface-Applied Curing Coat

UNITED States patent No. 1,867,421 has been granted to W. H. Rowan and H. K. Buckner to cover a method of protecting the surface of freshly placed concrete during the curing period, by means of a water-repellent coating of paraffin or resin. The paraffin or resin is applied in solution, in a volatile solvent of the nature of gasoline.

Start Hearings on New York Building Code

THE first public hearing on the proposed new building code for New York City was held on June 1 before the committee on buildings of the Board of Aldermen. The completed code has been in the hands of the Board since November 22, 1932.

Tests of Iron-Portland and Low-Lime Slag Cements

INTERESTING results are shown in an extensive series of tests of ordinary, rapid-hardening, iron-portland, and low-lime slag cements, conducted by the municipal testing laboratory (Städtische Prüfungsanstalt für Baustoffe) of Vienna, Austria, according to *Building Science Abstracts* (London).

The tests show that so far as strength is concerned the quality of the iron-portland and low-lime slag cements now obtainable in Austria is considerably superior to the

requirements of the standard specifications for portland cement. In view of this fact, the report points out, strength tests alone can no longer be depended upon as an indication of the type of cement employed. Instead, the grading and proportioning of the aggregate and control of the water-cement ratio should be such as to take full advantage of the particular type of cement being used.

Effect of Soils on Concrete

EXPERIMENTS made in Switzerland to determine the influence of various types of soil on concrete are reported in the February (1933) issue of *Building Science Abstracts* (London). In carrying out the experiments, portland cement concrete pipes were made with cement contents of 300, 400 or 500 kilograms per cubic meter (509, 677 or 846 lb. per cu. yd.), and were laid in five different soils for periods of 4 and 5 years. Results indicated that 400 kilograms per cubic meter (677 lb. per cu. yd.) is the minimum cement content that should be employed in pipe manufacture. However, the method of manufacture was also an important factor in the durability of the pipe.

The tests disclosed that hydrogen-ion concentration is greater in the case of pure carbon dioxide solutions than when calcium salts are present, bicarbonate being then formed. Studies were also made of hydrogen-ion concentrations for (1) pure carbon dioxide solutions, (2) carbon dioxide solutions in the presence of calcium carbonate, in highly acid humus, and in humus containing various lime contents.

It was found that exchange took place between magnesium ions and the calcium ions in cement. A content of more than 2 per cent of magnesium oxide, soluble in warm hydrochloric acid, can be a cause of disintegration of cement, especially if the magnesia is combined as bicarbonate.

Regulations for Design of Flat-Slab Concrete Floors

THE Institution of Structural Engineers (London) has prepared new regulations to govern the design of flat-slab floors in reinforced concrete, according to *Building Science Abstracts*. The regulations include definitions, scope, design moments, width of reinforcing bands, slab thickness, arrangement of reinforcement, openings, partitions and walls, shearing stresses, and supporting columns.

American Standards Year Book

THE American Standards Year Book for 1932 and 1933 is now available for distribution by the American Standards Association, 29 West 39th Street, New York. No separate edition was issued in 1932.

All standards having an official ASA status as of April 1, 1933, are listed in this 44-page book.

Mixtures for Vibrated Concrete in Production of Burial Vaults

By W. G. KAISER

Manager, Cement Products Bureau, Portland Cement Association, Chicago, Ill.

AT the suggestion of several members of the N. C. B. V. A., I have shown the approximate mixes used in making the 3 by 6-in. test cylinders broken in the compression tests made by Professor Danforth yesterday. These mixes are for air-dry aggregates and are based on dry sand weighing 100 lb. per cu. ft., and pea gravel weighing 105 lb. per cu. ft. If we were using damp sand, the proportions of sand would be somewhat higher, due to bulking.

Test Specimens Moist-Cured

For all the mixes, 5 gallons of water were used per sack of cement. The cylinders were 14 days old when tested, having been cured 2 days in the molds and moist-cured for 5 additional days in the moist room of the Portland Cement Association research laboratory. They were then stored in air 7 days until tested.

The purpose of these tests was to make a study of suitable mixes for vibrating. It is not to be regarded in any sense as a comparison of hand tamping versus vibration. Some of the mixes in the cylinders placed by hand had a slump of 10 in. and were entirely too wet for placing by vibration. Other mixes were too stiff for placing by any method other than vibration.

Strength Exceeds Requirements

As we discuss the results of the tests, let us keep in

TABLE—DEVELOPMENT OF MIXES FOR PLACING CONCRETE BY VIBRATION

Compression tests of 3 by 6-in. cylinders.

Cement—A mixture of four brands.

Aggregate—Fine: Sand graded 0-No. 4. Coarse: Pea gravel graded No. 4- $\frac{3}{4}$ in.

Water content—5 gal. per sack of cement.

Curing—All cylinders cured two days in forms and moist cured for 5 additional days and stored in air until tested.

Age of cylinders—14 days old on May 18, 1933.

Area of cylinders—7 sq. in.

DETAILS OF BATCHES

Mix	Ref. No.	Weight of Aggr.—Lb.		Slump, In.	Cement, Per Cu. Yd.	Compressive Strength—			
		Per Sack F.	C.			A	B	C*	Aver.
		Placed by Hand							
1-1½	1	150	—	10	10.5	6,415	6,503	6,700	6,505
1-1-1⅞	2	105	120	10	9.0	5,050	5,215	5,600	5,290
1-1½-1½	3	150	165	7	7.6	5,220	5,975	5,865	5,690
1-1¾-1¾	4	175	190	3	7.0	6,085	5,810	6,350	6,081
Placed by Vibration									
1-1½-1½	5	150	165	7	7.6	5,555	5,565	5,390	5,500
1-1¾-1¾	6	175	190	3	7.0	6,530	6,765	5,865	6,390
1-1½-2½	7	150	255	3	6.6	6,605	6,225	6,040	6,290
1-1¾-2	8	185	200	0	6.7	7,210	7,355	7,370	7,310
1-1½-3	9	150	315	0	6.0	7,855	8,250	7,995	8,030

*Cylinders tested at P. C. A. laboratory, Chicago.

The tests described in this article, and their discussion during the following day, constituted one of the principal features of the fourth annual convention of the National Concrete Burial Vault Association, held in Cleveland, Ohio, on May 18 and 19. Other papers and discussions dealt with sales methods and service, and a round-table discussion covered several additional problems of this industry.—Editor.

mind the quality of concrete we are aiming at in vault manufacture. The American Concrete Institute specifications, which are your guide in this respect, require that 3 by 6-in. cylinders develop a minimum compressive strength of 4,500 lb. per sq. in. when 28 days old, or at an earlier date in case the vault is to be sold before it is 28 days old. Now we should allow ourselves some leeway and design our mixes for a 5,000-lb. concrete to make certain that no tests fall below the minimum of 4,500 lb. per sq. in.

The tabulation of results shows that in all our tests we were able to exceed the required compressive strength of 4,500 lb. per sq. in. by a comfortable margin. It should be recalled here that these cylinders were cured under almost ideal conditions for 7 days and that the mixing and placing were under very close control.

How Moist-Curing Increases Strength

A word about curing will not be out of place here. You will recall that at your meeting a year ago, Mr. Allan and Professor Danforth tested a number of 3 by 6-in. cylinders. Those cylinders were made with water-cement ratios varying from 3¼ to 9 gallons of water per sack of cement. These tests showed that a 5-gallon mix would develop the required strength to meet the A. C. I. specifications for vaults. In fact, properly cured cylinders of mixtures containing 5 gallons of water per sack of cement developed an average strength of 5,730 lb. per sq. in. at 28 days. The same concrete made in cylinders and stored in air developed an average compressive strength of but 4,010 lb. per sq. in. In other words, proper moist curing resulted in an increase of approximately 1,700 lb. per sq. in. compared with storing in air. This was true throughout the tests, which are reported in the *Proceedings* of your third annual meeting. Summing up those tests, moist-cured cylinders were about 2,000 lb. per sq. in. stronger than specimens stored in the air.

Discussion of Test Results

The water-cement ratio law, as you will remember, is about as follows: The strength, watertightness, durability and other desirable properties of concrete are determined by the ratio of cement and mixing water so long as aggre-

gates are sound and the mix is plastic and workable. The less water used per sack, the stronger the concrete. Let us examine this law more closely. It says that the mix must be plastic and workable, and that no doubt meant it should have those qualities for hand-placing methods. Plastic, workable mixes are often described as those which can be placed with light tamping or spading. Referring to our table, we note that some of the mixes are too stiff for hand placing (Refs. 4, 6, 7, 8 and 9). Samples No. 1 and 2 had a slump of 10 in. and were too sloppy to be classed as plastic and workable. In placing concrete of this consistency, there would be a tendency toward segregation. Samples No. 3 and 5 were plastic and workable.

Note the uniformity of the average compressive strength of both the hand-placed and the vibrated cylinders. It would appear, therefore, that the water-cement ratio applies for workable mixes. Mixes for specimens No. 8 and 9 had practically no slump, clearly out of the range of hand-tamped concrete except in heavy mass work.

Perhaps the most striking results of the tests is the extraordinarily high compressive strength developed in the vibrated cylinders 8 and 9—7,315 and 8,030 lb. per sq. in., respectively. This was due to the fact that we were able to increase the amount of coarse aggregate in the mix.

A 1:1½:3 mix, vibrated, gave us a stronger concrete than a 1:1½ mix, hand placed, although the cement content was less in the stronger concrete. To produce a cubic yard of 1:1½:3 concrete would require but 6 sacks of portland cement, as compared to 10.5 sacks for the 1:1½ mix. In the manufacture of an average vault, this would mean a saving of approximately a sack of cement per vault, yet actually producing a superior product.

Experiments with Aggregate Available

You could take this saving per vault and invest it in advertising your product or in extending the activities of your association with the result that you could very materially increase your volume of business.

I am of the opinion that the vibration method of placing concrete appears to be a logical development in the technique of vault manufacture. You will want to experiment with different mixes and grading of aggregates. The results, of course, will vary with different aggregates, and each of you will have to determine what is the most economical mix with the aggregates available.

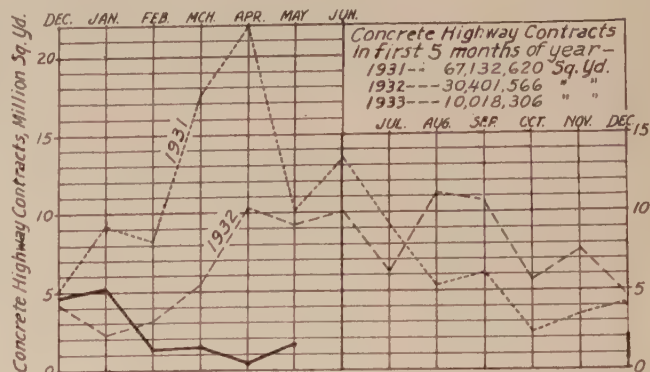
May Contracts for Concrete Roads Show Small Increase

While concrete highway awards in May were considerably above April, the yardage reported by the Portland Cement Association was far below that of previous years.

The total of 10,018,306 sq. yd. for the first 5 months of 1933 includes 119,080 sq. yd. awarded in April but not previously reported.

State highway departments were busy during June with preparations for utilizing their respective allotments from the \$400,000,000 fund provided in the federal government's public works program. That fund becomes available on July 1. In consequence, it is probable that the highway construction curve in the accompanying chart will tell a more optimistic story in the second half of the

year. On the other hand, much of that fund will be expended for highway structures, and will not appear in the yardage totals. Much will be utilized also in building secondary road systems which, in many cases, will be built of types of construction less durable than concrete.



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Benj. Wilk Elected to Head Products Association

Benjamin Wilk, Detroit, Mich., was elected president of the Concrete Masonry Association in its recent annual meeting at Chicago. He is general manager of the Standard Building Products Co., Detroit.

For years a heavy contributor to the fund of technical knowledge on products manufacture, Mr. Wilk is well known throughout the industry.

From the Patent Office

By J. KAPLAN

Patent Attorney, Washington, D. C.

MAKING CONCRETE FOR CONDUIT TILE—No. 1,903,976. Robert M. Burns of New York, N. Y., Assignor to Bell Telephone Laboratories, Inc., of New York. Patented April 18, 1933.

This invention relates to concrete ducts which are used for protecting lead cable sheath, and to the process of making the same. The object is to provide a cable duct in which the corrosive effect of lime on the lead cable sheath is prevented or retarded.

According to this invention concrete cable ducts are constructed by introducing a certain quantity of soluble silicate as water glass silica or siliceous slag in the concrete mixture while constructing the cable duct. The silicate has the property of neutralizing and considerably retarding or preventing the corrosive lime effect on the cable sheath through the formation of a silicate film on the surface of the cable sheath.

CONCRETE SPREADER—No. 1,907,668. John F. Robb of Cleveland Heights, Ohio. Patented May 9, 1933.

In concrete road building operations, mechanical devices for spreading the concrete as it is discharged from the mixers have already been employed with noteworthy increase in the efficiency of the road building operations and a marked saving of the time and labor required for the manual carrying out of such operations, in addition to obtaining a more even distribution of the mixed concrete.

Mixing drums mounted upon trucks and adapted to mix a charge of concrete and to maintain such charge in a thoroughly mixed condition while being transported to the location of operations are becoming widely employed; and the invention contemplates the provisions of a simple and convenient form of distributor readily attachable to such trucks or "transit mixers" for assuring an even laying of the mixed concrete as it is discharged from the transit mixer.

HOW TO DO IT

♦ Questions and Answers ♦
Consultation and Comment

◀ A department devoted to the solution of problems encountered in concrete work. Readers are welcome to add to or improve upon the suggestions printed and to submit their views for possible publication. ▶

Acid-Resistant Linings for Concrete Tanks

We contemplate building several concrete tanks for storing wine and cider. Do you recommend the lining of these tanks to prevent possible damage to the concrete; and if so, what material has been found suitable for the purpose?—C. W. B., Orlando, Fla.

Concrete that is well proportioned, well mixed, and placed carefully should be so impermeable to liquids that lining will not be required for the purpose you have in mind. Nevertheless, it is well to guard against the possibility of careless workmanship by coating the inner surface of the tanks with an acid-resisting coating.

Considering the necessity in this case of avoiding the taste of the liquids to be affected by the lining coat, a coating of paraffin wax should be highly satisfactory. One company with headquarters in New York specializes in the construction and lining of reinforced concrete tanks for the fermenting and storage of wines and fruit juices.

Other coatings often applied to the inner surface of concrete tanks to be used for the storage of industrial liquids include acid-resisting asphalt, mixtures of pitch and tar, and glass plates jointed with acid-resisting cement.

Further data on this subject will be found on page 32 of the February (1932) issue of CONCRETE.

Control of Concrete Mixtures

Can you refer me to any publication appearing during the last two years, in which the water-cement ratio method of controlling the quality of concrete is fully explained?—A. L., Brooklyn, N. Y.

A complete explanation of the scientific control of the character and quality of concrete mixtures will be found in a series of 12 articles by Joseph A. Kitts, appearing in consecutive issues of CONCRETE from May, 1932, to April, 1933, under the heading "Co-ordination of Basic Principles of Concrete Mixtures."

Insulating Exterior Walls; Eliminating Interior Plaster

I am planning to build a fireproof house near my concrete products plant, primarily as my home, but also as a demonstration house to show what may be accomplished with concrete. Do you consider it necessary to insulate the outside walls in this climate, in view of the fact that hollow wall units will be used?—W. F. W., Oklahoma City, Okla.

The hollow spaces in the wall units will in themselves have very little insulating value. Not only the exterior walls, but also the roof and the topmost ceiling, should be insulated, for such insulation will be a protection against both heat and cold.

Inasmuch as this is to be a demonstration home, it is suggested that you present something distinctive by means of an artistic interior that eliminates plaster on both walls and ceilings. This may be accomplished through the use of 3-in. light-weight concrete furring tile to insulate the exterior walls, and the same kind of tile for interior partitions, preferably laid in the form of ashlar. Reinforced concrete floor slabs will produce a flat ceiling. The entire interior may then be painted in a sketchy technique with cement paint, with a most pleasing result. Ordinarily it will be found desirable to make an exception of the kitchen and bath room, which may be finished in the more conventional way.

If you have not obtained the two booklets, "Low-Cost Fireproof Concrete Homes" and "Concrete Ashlar Walls," published by the Portland Cement Association, you should do so before starting your plans.

Light-Weight Aggregate for Concrete Vaults

Have you any data available on the use of light-weight aggregates for use in the manufacture of concrete burial vaults?—C. S. C., Harrisburg, Penna.

Some products manufacturers have been successful in the use of commercial light-weight aggregates of processed slag or burned clay, in the manufacture of concrete burial vaults.

When trying such aggregates for the first time, the manufacturer should keep in mind that the action of these light-weight aggregates will differ from that of ordinary concrete aggregates. As a consequence, he should first experiment with various mixtures, in accordance with recommendations obtained from the producer, in order to determine the most suitable proportions, the proper quantity of water, and the manner and time of mixing.

Unpublished results of tests made quite recently have indicated a distinct improvement in the density and other favorable properties of concrete used in vault manufacture, when the molds were vibrated by a high-frequency vibrator. The vibrator was operated in short spurts as the concrete was being deposited in the molds. Vibration of a mold should not exceed 15 seconds or thereabouts, since too long a period may be harmful to the concrete.

Oil for Coating Forms

We manufacture concrete burial vaults and we have been using ordinary engine oil on the metal molds to keep the concrete from sticking. This oil, however, seems to kill the cement near the surface. Is there some special preparation on the market for this purpose?—J. D. K., Reading, Penna.

Several companies have put on the market a concrete form oil which is prepared especially for that purpose. It does not affect the setting of the cement. A list of the manufacturers is being sent.

New Books and Pamphlets

Model Code for Industries Issued by Manufacturers Group

A MODEL CODE FOR SELF-GOVERNING INDUSTRIES is the title of a 20-page printed pamphlet issued by the National Association of Manufacturers, Union Trust Building, Washington, D. C.

This model code, written by Dr. A. P. Haake, managing director of the National Association of Furniture Manufacturers, is designed to aid industrial and trade association executives in the formulation of their own codes of fair competition under the provisions of the industrial control section of the National Industrial Recovery Act.

Concrete Form Work in Third Revised Edition

DESIGN AND CONSTRUCTION OF FORMWORK, THIRD REVISED EDITION, by A. E. Wynn. Published by Concrete Publications, Ltd., London, England. American distributors, Concrete Publishing Co., 400 W. Madison St., Chicago. Cloth, 312 pages, 5½ by 8½ in. Many plates and illustrations. Price \$6.00.

In this third revision of this well known book on concrete forms, considerable space has been devoted to steel forms. The author expresses the belief that, because of the increasing cost of timber, the use of metal forms and other special forms will continue to increase. The greater use of rapid-hardening cement, coupled with standardized form work, may in time replace our present methods of wooden form construction.

Highway Design Practice

An illustrated pamphlet of 20 pages, 6 by 9 in., containing tabulated results of a study of current state highway practice in the design of concrete pavements has been issued under date of May, 1933, by the Wire Reinforcement Institute, National Press Building, Washington, D. C.

Data on slab cross-sections, longitudinal and transverse joints, use and placing of reinforcement, use of dowels, and design trends, are among the subjects covered in the text. A tabulation of four pages provides information on all essential features of current design practice in each of the 48 states. Further details on practice in individual states are given in an appendix.

Clay in Concrete

CLAY IN CONCRETE, by D. A. Parsons, is the title of an illustrated pamphlet of 18 pages, 6 by 9 in., issued by the National Bureau of Standards as Research Paper No. 529. The pamphlet is a reprint from the Bureau of Standards *Journal of Research*, February, 1933.

The pamphlet comprises a report of tests to determine the effect of finely divided clays on properties of concrete such as compressive strength, absorption and permeability, when substituted for 10 per cent of the volume of the cement, or 7½ per cent of the volume of the fine aggregate. Copies are available at 5 cents each, from the Superintendent of Documents, Government Printing Office, Washington, D. C.

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NATIONAL LIME ASSOCIATION; Norman G. Hough, Secretary and Manager, 927 Fifteenth St., N. W., Washington, D. C.

NATIONAL READY-MIXED CONCRETE ASSOCIATION; V. P. Ahearn, Secretary, 545 Munsey Bldg., Washington, D. C.

NATIONAL SAND AND GRAVEL ASSOCIATION; V. P. Ahearn, Executive Secretary, 545 Munsey Bldg., Washington, D. C.

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NORTHWEST CONCRETE PRODUCTS ASSOCIATION; W. P. Hews, Secretary-Treasurer, Yakima, Wash.

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RAIL STEEL BAR ASSOCIATION; H. P. Bigler, Engineering Secretary; Builders' Bldg., 228 N. La Salle St., Chicago, Ill.

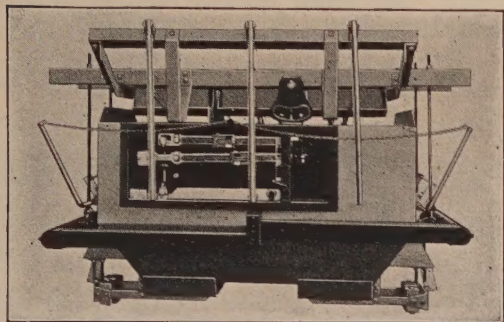
WIRE REINFORCEMENT INSTITUTE; R. D. Bradbury, Director, National Press Bldg., Washington, D. C.

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Passage of the National Recovery Act by Congress means re-newed activity for the entire Construction Industry . . . It means the scrapping of depression methods and depression theories . . . Cost figures must again be based upon modern methods . . . and that means modern equipment.



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One North La Salle Street

Chicago, Illinois

Plastering Key, Exposed Aggregate Obtained by New Method

**"Retardo" Method Removes Surface
Skin of Cement from Concrete Face**

THERE are two reasons why it is sometimes necessary to remove the film of cement which is formed on the face of concrete. The reasons are—

- (a) To provide a key for plastering or rendering.
- (b) To reveal the aggregate of which the concrete is made, and thus produce an artistic surface texture and color.

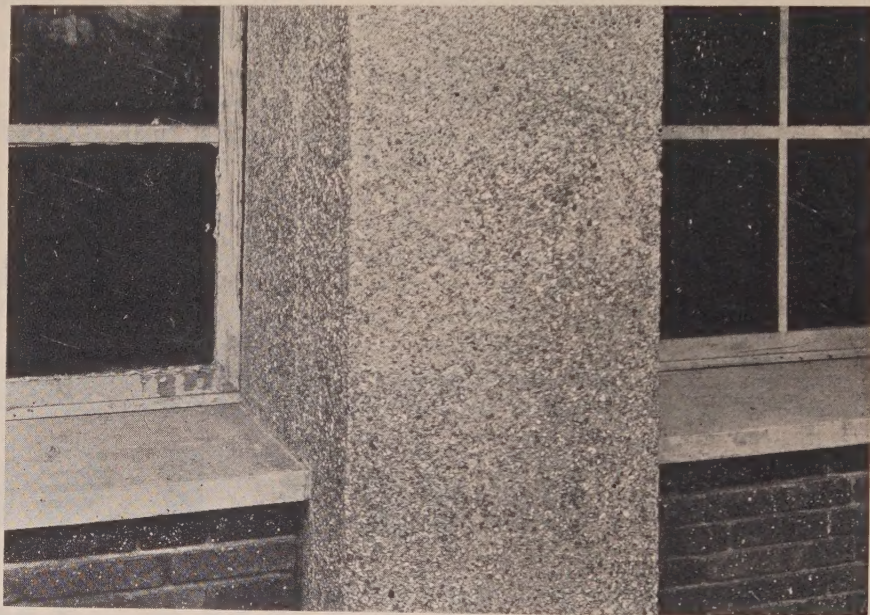
The method to be adopted is worthy of close consideration, since it is an item which can be relatively expensive if no previous steps have been taken to facilitate its removal.

With concrete which has been allowed to harden thoroughly there is no alternative but to hack away the surface—a time-consuming and costly operation. Sometimes it is possible to scrub the film away with a wire brush, after a liberal application of water, if the form work can be removed while the concrete is still green; but a delayed removal makes scrubbing almost impossible owing to the concrete face becoming too hard.

The simplest method of all, it is claimed by the New York office of the Cement Marketing Co., Ltd., is to treat the face of the form work, against which the freshly made concrete is placed, by painting it with a solution of "Retardo."

"Retardo," as its name implies, has a retarding action on the setting time of cement with which it comes into contact. All that is necessary after removing the form work is to brush off the unset cement and wash down the surface with water. The retarding action is confined to the cement on the surface and the body of the concrete is not injured in any way.

"Retardo" solution does not stain the concrete or other materials with which it



Showing aggregate exposed by means of new English method in which face of form work is painted with solution

comes into contact. By its use the necessity for oiling the form work is obviated.

The cost of surface-tooling is such a varying item that it is impossible to give an accurate comparison between the production of a key by that means and by the use of "Retardo." The difference has been shown to be anything from 25 to 80 per cent in favor of the latter process, it is claimed.

"Retardo" is supplied in the form of a powder to which water is added before use—1 lb. of powder making sufficient solution to cover between 3 and 4 square yards.

The accompanying illustration, taken at the new Masonic Hospital, London, shows a concrete surface with the aggregate revealed by the use of "Retardo."

MANUFACTURERS' NEWS

Moderate Price Equipment to Be Made by Gunitor Company

A man widely known for his cement gun developments for many years is undertaking the manufacture of moderate priced machines of this type.

He is C. L. Dewey and he heads the newly organized Gunitor Company, Elkhart, Ind. Machines for the pneumatic placing of cement, concrete and refractory materials are to be manufactured. Associated with Mr. Dewey are W. McK. White, vice-president, and Sidney L. Dewey, secretary.

Several sizes of Gunitors will be offered

for immediate sale, all of very light weight, low price and with numerous mechanical improvements. Among innovations in the new line is an electric motor operated one-man model with electrical remote control; units including gasoline engine, air compressor and water pump, fully housed and mounted on steel chassis with rubber tired wheels; and the Complete Gunitor, including above apparatus, pug mill for mixing all material, separation screen, and mechanical delivery to charging chambers.

The Gunitors will be sold outright as well as leased, and marketed through established equipment distributors.

T. L. Smith Co. Reorganized

The T. L. Smith Co. is now in receivership and will be operated entirely separately from its former affiliated companies, National Equipment Corp., Koehring Co., etc., according to an announcement.

Harold E. Smith, president of the Smith company from 1916 until 1930, has been appointed receiver. The organization which will be used by him will be composed as far as possible of men who were associated with him while the company was under his management.

The company is in position to service any of its machines now in the field and

MORE MODERN THAN EVER
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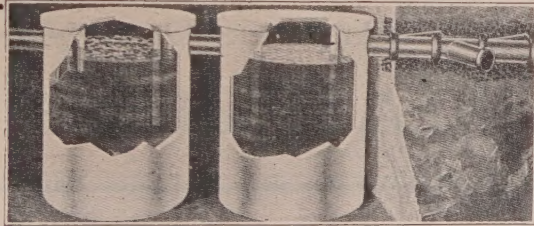
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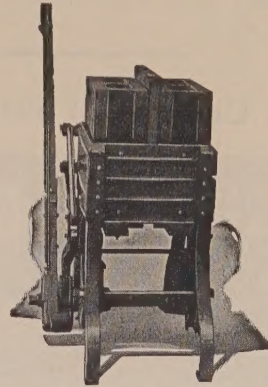
Building
 Blocks

Tile

Flue
 Blocks

Coping
 Blocks

Manhole
 Blocks



Double Block Hand Press Stripper

Hand or power machines

The Multiplex Concrete Machinery Company

Elmore

Ohio

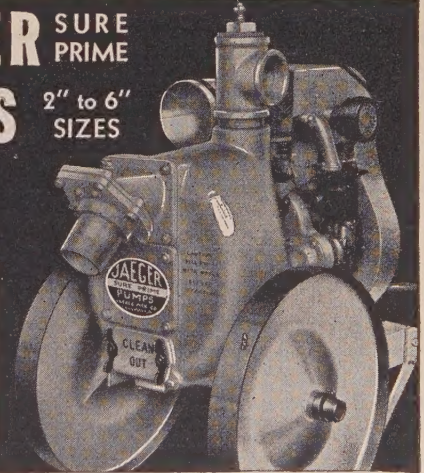
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Complete equipment for concrete products plants

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to fill orders for repair parts and new machines.

Toledo Research Exhibit

An Exhibit of Practical Research, from June 15th to October 15th, is announced by the *Toledo Scale Co.* at its Chicago office, 2033 South Michigan Ave., during A Century of Progress.

The purpose of this display is to bring to the attention of industrial executives visiting Chicago the results of the Toledo company's program of practical research. Here will be shown in dramatic form not only many types of scales necessary for accurate weighing operations, but also many unique devices for measuring practically every physical property of a commodity or product.

"A Century of Progress" Exhibit



A central concrete mixing plant in diorama and a concrete mixer and cement mill chain drives in translights

form part of the Link-Belt Co. exhibit, depicted above, at A Century of Progress at Chicago, now open.

H. H. Potts Corporation Reorganized

*Pottsc*o is an aggregate composed of expanded slag granules, produced and sold under the basic patent covering lightweight slag aggregate held by *Harry H. Potts*, president of the former *H. H. Potts Co.*, now taken over by the *Pottsc*o Corp., with offices at One North LaSalle Street, Chicago. Mr. Potts remains as president. *E. A. Magurn* has joined the organization as vice-president.

*Pottsc*o has been furnished as lightweight concrete floor-fill on all the floors of the new Chicago Post Office building, and deliveries are still to be made on the last unit of this building, now under construction. Deliveries have just been completed on the new Cincinnati Post Office building, and it is said that there are prospects for considerable new business.

Light Wines and Beer Tanks

The *Turner Construction Co.* of New York, Philadelphia and Boston, and the *Rostock & Baerlocher Co.* of Vienna, Berlin and Paris, have just formed the *Turner-Rostock Corp.* for the purpose of constructing in the United States and Canada reinforced concrete fermenters and storage tanks lined by the special *Rostock* process for storing such liquids as beer, wines and alcohol.

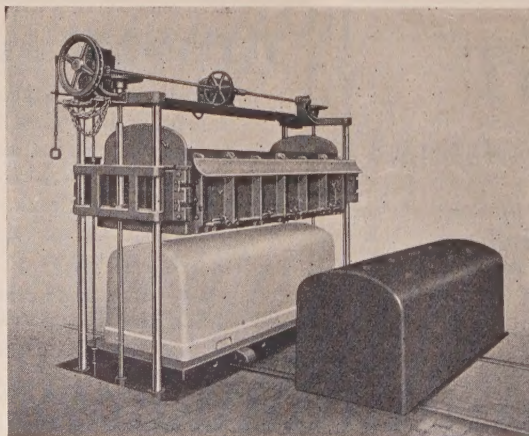
EQUIPMENT AND MATERIALS

Burial Vaults on Quantity Production Basis by Alliance Process

Quantity production of concrete burial vaults is one of the talking points of the Alliance process. A mold of modernistic design is another.

The means to quantity production is the Alliance concrete products machine, the *Machined Steel Casting Co.*, Alliance, Ohio, states in a folder entitled 'How You Can Make Money in Concrete Today!' The machine consists of an inner mold on wheels, an outer mold with hinged crown extension forms, a lifting ring on flanged wheels, motor-operated screws for raising and lowering the outer form and ring to permit stripping forms from and removal of the product, and, end brackets mounted on four guide posts to which the outer mold is bolted for the stripping operation.

Vaults are cast in metal forms mechanically removed from the product while it is still green. Trowel finishing is thus permitted and grinding and filing eliminated. The average working time on a "Burial Closure" is given as thirty minutes.



Designs and styles of the product are said to be limitless. Either an air or an asphalt seal may be used, or, a special seal may be designed. The modernistic vault may be made with either a top or bottom seal.

Casting and stripping operations are described in detail in the booklet referred to. The latter also contains a typical production layout.

Claims Chamotte Increases Concrete Durability

Greater durability of concrete is attained through the use of *Chamotte*, a slag-like substance, according to *Hugo Effenberger*, Racine, Wis.

Chamotte is said to be a well-balanced natural mineral comprising silica, potash soda, alumina, and iron oxide, having complete resistance to heat and acids.

Other claims made for it are the absolute prevention of efflorescence, increase in density and workability, as well as immunization against acids, oils and liquids.